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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DANG, HUNG Q	

ART UNIT	PAPER NUMBER
2612	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,277	HUANG ET AL.	
	Examiner	Art Unit	
	HUNG Q. DANG	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-21,24-28 and 34-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 5-21, 24-28, and 34-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to the claims' amendment dated 5/6/2009. The amendments of claims 1, 5, 10, 24; and the cancellation of claims 2-4, 22-23, 29-33 have been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 21, 24 and 28 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 5-17, 20, 21, 24-28 and 36-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky U.S. Patent 6,757,218.

Note: according to page 8 lines 12-16 and page 10 lines 15-26 of the specification, the claimed modulator in claim 1 is a stop valve that opens or blocks the access to the liquid volume (132)....; and together with the Helmholtz resonator...the reflected wave becomes a BPSK (binary phase shift key) modulated wave, transmitting data to the surface.

Regarding claims 1, 16 and 38, Dubinsky teaches an acoustic telemetry apparatus for communicating digital data from a down-hole location through a borehole to the surface comprising (see figure 2):

an acoustic channel (figure 2, channel 204) terminated at a down-hole end by a reflecting terminal (figure 2, unit 208);

an acoustic wave generator located at the surface and providing an acoustic wave carrier signal within said acoustic channel (column 4, lines 36-45);

a modulator located at said down-hole location and adapted to modulate said carrier wave in response to a digital signal (paragraph bridging columns 4-5; and column 5 line 63 to column 6 line 10); and

one or more sensors (figure 2, unit 214) located at the surface adapted to detect related modulated information of acoustic waves traveling within said acoustic channel.

Notice that from column 5 line 63 to column 6 line 10, Dubinsky teaches that the resonator having a **two-position** flap (426). The flap 426 is mounted to the body 422 on a controllable pivot 428 that allows the flap 426 to be controlled to at least two positions 426a and 426b.....One position 426a of the flap 426 results in a little or not reflection of a source signal. A second position 426b of the flap 426 results in a substantial reflection of the source signal. **Thus a binary string message is easily created** that is passively **transmitted to the surface as an echo signal by control of the flapper 426**.

As mentioned in the above NOTE, **the claimed modulator, as supported by the specification, is an open/close valve which operates in the same manner as the flapper taught by Dubinsky to ultimately generate binary data**.

So, clearly, Dubinsky does teach a modulator and a reflecting terminal switchable between a first state and a second state so that a binary string message can be created to be transmitted to the surface.

One of ordinary skill in the art would recognize that regardless of what type of modulation technique is employed, the ultimate goal is to generate a binary data signal to be transmitted to the surface. The typically known modulation techniques are BPSK, AM, FM, MSK, FSK, PSK, PM, CPM, QAM, RCM etc; and applying different modulation techniques as indicated would not be considered an inventive step. Therefore, by conventionality, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement phase shift modulation (BPSK) technique to the acoustic telemetry system disclosed by Dubinsky, as explained above.

Regarding claim 5, according pages 8-10 of the specification...the modulator comprises a Helmholtz resonator...and when the Helmholtz resonator is enabled...the acoustic impedance at the down-hole end of the annulus equals that of the resonator, and the reflected wave is phase-inverted; when disabled, the reflected wave has no phase change.

Dubinsky also teaches the same concept (paragraph bridging columns 4-5) of switching between a first state that cases the phase of an acoustic wave reflected at

said terminal to invert and a second state that maintains the original phase of the incident wave by operating the modulator (valve) and the Helmholtz resonator as described on pages 8-10 of the specification of this application.

Regarding claim 6, the acoustic channel disclosed by Dubinsky is also a column of liquid extending from the surface to a down-hole location (column 4, lines 36-48).

Regarding claim 7, the acoustic channel disclosed by Dubinsky is also formed by filling an annular volume in the borehole with a liquid (figure 2 and column 4, lines 36-48).

Regarding claim 8, Dubinsky also teaches that the acoustic channel is formed by filling a tubing string suspended in the borehole with a liquid (column 4, lines 36-46).

Regarding claims 10 and 24, the modulator disclosed by Dubinsky is also a Helmholtz resonator located in the vicinity of the reflecting terminal point (paragraph bridging columns 4-5). Also see the rejection of claim 1.

Regarding claim 11, the resonator disclosed by Dubinsky also comprises a liquid filled volume enclosed in a housing having a tubular opening to the reflecting terminal (column 5 lines 39-55; the tubular openings in this case are the controlled pistons).

Regarding claim 12, the resonator disclosed by Dubinsky also has two or more tubular openings to the reflecting terminal (column 5 lines 39-55; the tubular openings in this cases are the controlled pistons).

Regarding claim 14, Dubinsky also teaches an acoustic receiver (figure 2, unit 210) in a downhole location adapted to receive acoustic channel in a down-hole location.

Regarding claim 15, the digital data disclosed in Dubinsky's system is also encoded digital data (see figure 2).

Regarding claim 17, the sensors disclosed by Dubinsky are also connected to a signal processing unit adapted to filter the carrier wave signal from detected information (column 4, lines 44-46).

Regarding claim 20, Dubinsky also teaches the use of the apparatus of claim 1 in a well stimulation operation. The well stimulation operation in this case is the operation of the downhole Helmholz resonator being resonated by the received acoustic signal.

Regarding claims 21, 28, 40 and 42, claims 21, 28, 40 and 42 recite the steps of operating the acoustic telemetry apparatus of claim 1; Since the apparatus has been shown to be obvious, the steps of operating the apparatus in this intended manner would also have been obvious.

Regarding claim 25, Dubinsky also teaches the steps of performing measurements of downhole parameters; encoding said measurements into a bitstream; and controlling the reflecting properties of the reflecting terminal in response to said encoded bitstream (column 7, lines 34-50).

Regarding claim 9, even though Dubinsky does not specifically that the column of liquid has a viscosity of less than 3 x 10^(-3) NS/m^2, however, it would have been

obvious to one of skilled practitioner to derive such viscosity through routine experimentations to achieve an optimal liquid channel for said acoustic data transmission.

Regarding claim 13, even though Dubinsky does not specifically teach that the acoustic wave generator is adapted to simultaneously generate acoustic waves at different frequencies, however, one of ordinary skill in the art at the time the invention was made would recognize that if a downhole data receiver is desired, then a different acoustic signal, which has a different frequency from the frequency of the acoustic signal that is used to resonate the downhole resonator, can be used to transmit control data to the downhole receiver just like in any other conventional downhole telemetry systems.

Regarding claims 26 and 37, even though Dubinsky does not specifically mention the step of selecting the frequency of the carrier wave such that it is close to the resonance frequency of the resonator used to modulate said carrier wave, however, one of ordinary skill in the art would recognize that Helmholz resonator optimally operates at its resonant frequency. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the step of selecting the frequency of the carrier wave such that it is close to the resonant frequency of the resonator so that the resonator can be resonated (enabled) to modulate the carrier wave.

Regarding claims 36, 39 and 41, even though Dubinsky does not specifically disclose that the acoustic wave carrier signal is continuous, however, one of ordinary

skill in the art would recognize that if data is desired to be continuously transmitted and received, then clearly, the acoustic wave carrier signal would have to be continuous.

Regarding claim 27, Dubinsky teaches the method of claim 21. However, Dubinsky does not teach the steps of scanning through a range of possible carrier frequencies; monitoring at the surface reflected and modulated wave signal; selecting the frequency of the carrier wave such that the detection of said reflected and modulated wave signal is optimized; and commencing the communication of down-hole measurements.

The claimed steps are merely the conventional method of selecting an optimal frequency through a range of possible frequencies to achieve optimal data transmission with minimal noise and interference. The Examiner gives Official Notice that such frequency selecting method has been commonly known and applied in many acoustic communication systems in order to optimize data transmission with minimal noise and interference.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide such frequency scanning steps to the method disclosed by Dubinsky so that optimal acoustic transmission can be achieved.

5. Claims 18-19 and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky U.S. Patent 6,757,218 in view of Priest et al. U.S. Patent 5,444,324.

Regarding claim 19, Dubinsky does not specifically mention that the downhole power generator is adapted to convert acoustic energy from an acoustic wave signal generated at the surface.

Priest et al., in the same field of endeavor, discloses the conventionality of using down-hole power generator that is adapted to convert acoustic energy from an acoustic wave signal generated at the surface (column 1, lines 20-24).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the conversion of the received acoustic wave signal into electrical signals for use as the downhole power generator disclosed by Dubinsky as suggested by Priest et al.

Regarding claim 18, Dubinsky teaches the apparatus of claim 1. However, Dubinsky does not specifically teach wherein the modulator comprises a piezoelectric actuator.

Priest et al., in the same field of endeavor, teaches a downhole acoustic telemetry apparatus and Priest et al. also discloses the conventionality of using piezoelectric element(s) to increase the voltage response to acoustic energy (column 1, lines 65-67).

As mentioned in the rejection of claim 19, Dubinsky in view of Priest et al. teaches the conversion of the received acoustic wave signal into electrical signals for use as the downhole power generator. Since Dubinsky teaches a downhole apparatus which uses acoustic energy transmitted from the surface to actuate/modulate a downhole transmitter; and Priest et al. further suggests using piezoelectric elements(s)

to increase the voltage response to the received acoustic energy. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a piezoelectric actuator to the modulator disclosed by Dubinsky, as evidenced by Priest et al., so that more voltage/power can be generated through the use of said piezoelectric actuators, which results in an increasing amplitude of a generated acoustic signal (see column 1 line 60 to column 2 line 22).

Regarding claim 34, Priest et al. also discloses the conventionality of using an electro-acoustic transducer to convert the energy of the received acoustic wave into electrical energy for the down-hole power generator to provide power to the down-hole tools (column 1, lines 16-45).

Therefore, by conventionality, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an electro-acoustic transducer to the downhole generator disclosed by Dubinsky, as disclosed by Priest et al., so that downhole tools can be powered up by using acoustic-converted electrical energy.

Regarding claim 35, the Examiner gives Official Notice that capacitors have been commonly known and used for storing electrical energy. Therefore, it would have been obvious to provide an energy storing capacitor to the downhole power generator of the system disclosed by Dubinsky to store electrical energy to provide energy/power to one or more downhole devices.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q. DANG whose telephone number is (571)272-3069. The examiner can normally be reached on 9:30AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Zimmerman can be reached on (571) 272-3059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hung Q Dang/
Examiner, Art Unit 2612

/Timothy Edwards/
Primary Examiner, Art Unit 2612